

## WHAT IS CLAIMED IS:

1. A method for manufacturing a semiconductor device comprising the steps of:  
forming a semiconductor film comprising amorphous silicon and hydrogen over a substrate by using silane which is not diluted with hydrogen;  
patterning the semiconductor film to form semiconductor islands;  
introducing the substrate to a chamber for introducing an impurity element to the semiconductor islands;  
preparing an atmosphere comprising a dopant gas diluted with hydrogen;  
converting the atmosphere to a plasma by applying an electrical energy thereto; and  
introducing an impurity element in the dopant gas into the semiconductor islands by irradiating a laser light.
2. A method according to claim 1, wherein the silane is selected from the group consisting of monosilane, disilane and trisilane.
3. A method according to claim 1, wherein the dopant gas is selected from the group consisting of  $\text{AsH}_3$ ,  $\text{PH}_3$ ,  $\text{BF}_3$ ,  $\text{BCl}_3$ ,  $\text{B}(\text{CH}_3)_3$ , and  $\text{B}_2\text{H}_6$ .
4. A method according to claim 1, wherein the impurity element is introduced while heating at a temperature from 300 to 500°C.
5. A method for manufacturing a semiconductor device comprising the steps of:  
forming a semiconductor film comprising amorphous silicon and hydrogen over a substrate by using silane which is not diluted with hydrogen;  
drawing hydrogen out of the semiconductor film;  
patterning the semiconductor film to form semiconductor islands;  
introducing the substrate to a chamber for introducing an impurity element to the semiconductor islands;  
preparing an atmosphere comprising a dopant gas diluted with hydrogen;  
converting the atmosphere to a plasma by applying an electrical energy thereto; and

introducing an impurity element in the dopant gas into the semiconductor islands by irradiating a laser light.

6. A method according to claim 5, wherein the silane is selected from the group consisting of monosilane, disilane and trisilane.

7. A method according to claim 5, wherein the dopant gas is selected from the group consisting of  $\text{AsH}_3$ ,  $\text{PH}_3$ ,  $\text{BF}_3$ ,  $\text{BCl}_3$ ,  $\text{B}(\text{CH}_3)_3$ , and  $\text{B}_2\text{H}_6$ .

8. A method according to claim 5, wherein the impurity element is introduced while heating at a temperature from 300 to 500°C.

9. A method for manufacturing a semiconductor device comprising the steps of:  
forming a semiconductor film comprising amorphous silicon and hydrogen over a substrate by using silane which is not diluted with hydrogen;  
patterning the semiconductor film to form semiconductor islands;  
introducing the substrate to a chamber for introducing an impurity element to the semiconductor islands;  
preparing an atmosphere comprising a dopant gas diluted with hydrogen; and  
decomposing the dopant gas by applying an electrical energy while irradiating a laser light to the semiconductor islands.

10. A method according to claim 9, wherein the silane is selected from the group consisting of monosilane, disilane and trisilane.

11. A method according to claim 9, wherein the dopant gas is selected from the group consisting of  $\text{AsH}_3$ ,  $\text{PH}_3$ ,  $\text{BF}_3$ ,  $\text{BCl}_3$ ,  $\text{B}(\text{CH}_3)_3$ , and  $\text{B}_2\text{H}_6$ .

12. A method for manufacturing a semiconductor device comprising the steps of:  
forming a semiconductor film comprising amorphous silicon and hydrogen over a substrate by using silane which is not diluted with hydrogen;  
drawing hydrogen out of the semiconductor film;  
patterning the semiconductor film to form semiconductor islands;

introducing the substrate to a chamber for introducing an impurity element to the semiconductor islands;

preparing an atmosphere comprising a dopant gas diluted with hydrogen; and

decomposing the dopant gas by applying an electrical energy while irradiating a laser light to the semiconductor islands.

13. A method according to claim 12, wherein the silane is selected from the group consisting of monosilane, disilane and trisilane.

14. A method according to claim 12, wherein the dopant gas is selected from the group consisting of  $\text{AsH}_3$ ,  $\text{PH}_3$ ,  $\text{BF}_3$ ,  $\text{BCl}_3$ ,  $\text{B}(\text{CH}_3)_3$ , and  $\text{B}_2\text{H}_6$ .

15. A method for manufacturing a semiconductor device having a semiconductor island including at least source and drain regions and a channel region therebetween, and a gate electrode adjacent to the semiconductor island, the comprising the steps of:

forming a semiconductor film comprising amorphous silicon and hydrogen over a substrate by using silane which is not diluted with hydrogen;

patterning the semiconductor film to form the semiconductor island;

introducing the substrate to a chamber for introducing an impurity element to the semiconductor island;

preparing an atmosphere comprising a dopant gas diluted with hydrogen; and

decomposing the dopant gas by applying an electrical energy while irradiating a laser light to the semiconductor island to form the source and drain region.

16. A method according to claim 15, wherein the silane is selected from the group consisting of monosilane, disilane and trisilane.

17. A method according to claim 15, wherein the dopant gas is selected from the group consisting of  $\text{AsH}_3$ ,  $\text{PH}_3$ ,  $\text{BF}_3$ ,  $\text{BCl}_3$ ,  $\text{B}(\text{CH}_3)_3$ , and  $\text{B}_2\text{H}_6$ .

18. A method for manufacturing a semiconductor device having a semiconductor island including at least source and drain regions and a channel region therebetween, and a gate electrode adjacent to the semiconductor island, the comprising the steps of:

forming a semiconductor film comprising amorphous silicon and hydrogen over a substrate by using silane which is not diluted with hydrogen;  
drawing hydrogen out of the semiconductor film;  
patterning the semiconductor film to form semiconductor island;  
introducing the substrate to a chamber for introducing an impurity element to the semiconductor island;  
preparing an atmosphere comprising a dopant gas diluted with hydrogen; and  
decomposing the dopant gas by applying an electrical energy while irradiating a laser light to the semiconductor island to form the source and drain regions.

19. A method according to claim 18, wherein the silane is selected from the group consisting of monosilane, disilane and trisilane.

20. A method according to claim 18, wherein the dopant gas is selected from the group consisting of AsH<sub>3</sub>, PH<sub>3</sub>, BF<sub>3</sub>, BCl<sub>3</sub>, B(CH<sub>3</sub>)<sub>3</sub>, and B<sub>2</sub>H<sub>6</sub>.